

Claims:

1. A method of modifying a surface of a wafer suited for fabrication of a semiconductor device comprising the steps of:

5 a) providing a wafer comprising at least a first material having a surface etched to form a pattern and at least a second material deployed over the surface of the first material;

b) contacting the second material of the wafer to a plurality of three-dimensional abrasive composites fixed to an abrasive article, the three-  
10 dimensional abrasive composites comprising a plurality of abrasive particles fixed and dispersed in a binder; and

c) relatively moving the wafer while the second material is in contact with the plurality of abrasive composites until an exposed surface of the wafer is planar and comprises at least one area of exposed first material and one  
15 area of exposed second material.

2. A method of modifying a surface of a wafer suited for fabrication of a semiconductor device comprising the steps of:

a) providing a wafer comprising at least one dielectric material  
20 having a surface etched to form a pattern and at least a conductive material deployed over the surface of the at least one dielectric material;

b) contacting the conductive material of the wafer to a plurality of three-dimensional abrasive composite fixed to an abrasive article, the plurality of abrasive composites comprising a plurality of abrasive particles, fixed and  
25 dispersed in a binder; and

c) relatively moving the wafer while the conductive material is in contact with the plurality of abrasive composites until the exposed surface of the wafer is planar and comprises at least one area of exposed conductive material and at least one area of exposed dielectric material.

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3. A method of modifying a surface of a wafer suited for fabrication of a semiconductor device comprising the steps of:

5 a) providing a wafer comprising at least one dielectric material having a surface etched to form a pattern, the dielectric material covered with at least one intermediate layer, and the intermediate layer covered by a conductive material;

10 b) contacting the conductive material of the wafer to a plurality of three-dimensional abrasive composites fixed to an abrasive article, the plurality of abrasive composites comprising a plurality of abrasive particles fixed and dispersed in a binder; and

15 c) relatively moving the wafer while the conductive material is in contact with the plurality of abrasive composites until the exposed surface of the wafer comprises at least one area of exposed conductive material and at least one area of exposed dielectric material.

4. The method of claim 3, wherein the intermediate material is an adhesion/barrier layer.

20 5. A method of modifying an exposed major surface of a wafer suited for fabrication of a semiconductor device, comprising the steps of:

25 a) providing a wafer comprising at least a first and a second materials, the first and the second materials each having a surface, at least one of the materials having a surface etched to form a pattern with an outer material deployed over the at least first and second materials;

b) contacting the outer material of the wafer to a plurality of three-dimensional abrasive composites fixed to an abrasive article, the plurality of abrasive composites comprising a plurality of abrasive particles fixed and dispersed in a binder; and

30 c) relatively moving the wafer with respect to the abrasive article while the outer material is in contact with the plurality of abrasive

composites until an exposed surface of the wafer is planar and comprises one area of exposed outer material and at least one area of exposed first material and one area of exposed second material.

5           6.       The method of any one of the claims 1, 2, 3, or 5, further comprising contacting the wafer and abrasive article in the presence of a working liquid.

7.       The method of claim 6, wherein the working liquid comprises an aqueous solution.

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8.       The method of claim 6, wherein the working liquid comprises a chelating agent, an oxidizing agent, an ionic buffer, a passivating agent, or combinations thereof.

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9.       The method of any one of the claims 1, 2, 3, or 5, wherein the exposed wafer surface of step c) has an  $R_t$  value less than 4,000 Angstroms.

10.      The method of any one of the claims 1, 2, 3, or 5, wherein the plurality of abrasive composites are precisely shaped.

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11.      The method of any one of the claims 1, 2, 3, or 5, wherein the abrasive article is attached to a subpad.

12.      The method of claim 11, wherein the subpad is a laminate of a polycarbonate sheet and polyurethane foam.

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13.      The method of any one of the claims 1, 2, 3, or 5, wherein the second, outer or conductive material is gold, silver, aluminum, tungsten, copper, or alloys thereof.

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5            15.     A method of modifying a surface of a wafer suited for fabrication of  
a semiconductor device comprising the steps of:

b) contacting the conductive material of the wafer to a plurality of three-dimensional abrasive composites fixed to an abrasive article, the plurality of abrasive composites comprising a plurality of abrasive particles fixed and dispersed in a binder; and

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